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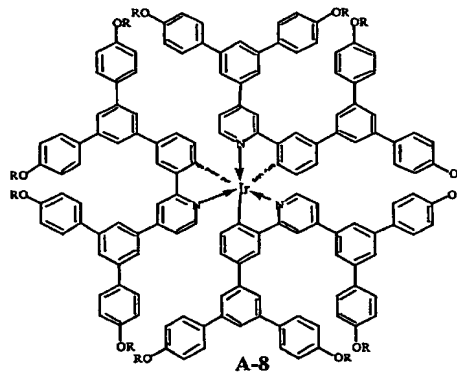
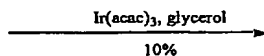
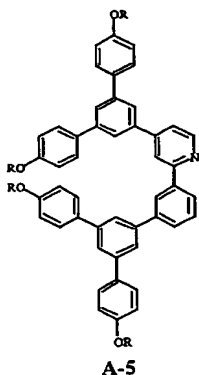
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[Continued on next page]

(54) Title: NEUTRAL METALLIC DENDRIMER COMPLEXES



(57) Abstract: A charge-neutral organometallic dendrimer is described, said dendrimer having the formula (I): CORE-[DENDRITE(-Q)_a]_n in which CORE represents a group of formula M_xY_z, in which M represents a metal cation, x represents an integer of 1 or more, each X which may be the same or different represents a mono-, bi- or tri-dentate coordinating group, z represents 0 or an integer of 1 or more, and each Y which may be the same or different represents a coordinating group, the total of (b.x) + (c.z) being equal to the number of coordination sites on M, wherein b is the number of coordination sites on X and c is the number of coordination sites on Y; n represents an integer of 2 or more; each DENDRITE which may be the same or different represents a dendritic molecular structure bonded to a group X; a represents 0 or an integer of 1 or more; and each Q which may be the same or different represents a surface group; CORE terminating in the first single bond which is connected to a branching group or branching atom of DENDRITE; which dendrimer has a structure in which no hemisphere of a notional sphere centred on M and containing the dendrimer is devoid of a said first single bond.



Published:

- with international search report
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

INTERNATIONAL SEARCH REPORT

Internat	Application No
PCT/GB	03725

A. CLASSIFICATION OF SUBJECT MATTER
 IPC 7 C07F15/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
 IPC 7 C07F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the International search (name of data base and, where practical, search terms used)
 EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P, X	WO 02 066552 A (LUPTON JOHN MARK ;SAMUEL IFOR DAVID WILLIAM (GB); LO SHI-CHUN (GB)) 29 August 2002 (2002-08-29) cited in the application	1,4-14, 17,19,20
X	claims 1-53; figures 2,4-8,17,19 examples 13,14 --- -/--	21-26,33

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
- *Z* document member of the same patent family

Date of the actual completion of the international search

7 November 2003

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20/01/2004

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INTERNATIONAL SEARCH REPORT

Intern: Application No
PCT/6/03725

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	MARKHAM J P J ET AL: "HIGH-EFFICIENCY GREEN PHOSPHORESCENCE FROM SPIN-COATED SINGLE-LAYER DENDRIMER LIGHT-EMITTING DIODES" APPLIED PHYSICS LETTERS, AMERICAN INSTITUTE OF PHYSICS. NEW YORK, US, vol. 15, no. 80, 15 April 2002 (2002-04-15), pages 2645-2647, XP001074763 ISSN: 0003-6951 cited in the application the whole document	1,4-13, 17-21
X	BALZANI V ET AL: "DENDRIMERS BASED ON PHOTOACTIVE METAL COMPLEXES. RECENT ADVANCES" COORDINATION CHEMISTRY REVIEWS, ELSEVIER SCIENCE, AMSTERDAM, NL, vol. 219-221, 2001, pages 545-572, XP001100645 ISSN: 0010-8545 cited in the application page 563 -page 567; figures 14,16	1,2,4-7
A	WO 02 14376 A (GRAY BRIAN LAWRENCE ;GARBER STEVEN (US); FOURKAS JOHN T (US); HOVE) 21 February 2002 (2002-02-21) formulas III; IV, 31, scheme 4 page 4 -page 16; claim 28	1,2
A	page 20	21

INTERNATIONAL SEARCH REPORT

Int. Application No.
PCT/ISA/210 03/03725

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☒ Claims Nos.: 15, 16, 34-37
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
see FURTHER INFORMATION sheet PCT/ISA/210

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this International application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box I.2

Claims Nos.: 15,16,34-37

Present claims 15 and 16 relate to a compound defined by reference to a desirable characteristic or property.

This attempt to define the compounds by reference to the result to be achieved causes lack of clarity to such an extent as to render a meaningful search of the aforementioned claims impossible.

Search of claims 34 - 37 was not possible due to their unclear backreference.

The applicant's attention is drawn to the fact that claims, or parts of claims, relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/GB 03/03725

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 02066552	A	29-08-2002	WO 02066552 A1	29-08-2002
WO 0214376	A	21-02-2002	AU 8477301 A	25-02-2002
			CA 2419485 A1	21-02-2002
			EP 1313559 A2	28-05-2003
			WO 0214376 A2	21-02-2002
			US 2002107138 A1	08-08-2002